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THE GENUS *ARIDELUS* OF TAIWAN (HYMENOPTERA: BRACONIDAE: EUPHORINAE)[1]

by
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Abstract: Nine species of *Aridelus* (Hymenoptera: Braconidae: Euphorinae) are reported in this paper. Seven species: *Aridelus antennatus*, *A. destitutus*, *A. longius*, *A. reticulatus*, *A. taiwanus*, *A. tsuifengensis* and *A. tungpuensis* are new to science. *Aridelus flavicans* Chao is new to Taiwan. All Taiwanese species of *Aridelus* are keyed, described and fully illustrated. A key to the genera of Euphorinae of Taiwan is also presented.

INTRODUCTION

Shenefelt (1969) included 35 genera and over 550 species of parasitic wasps in the subfamily Euphorinae. According to Shaw's analysis (1985), he placed *Meteorus* in a separate subfamily (Meteorinae), and treated it as the sister group of all the remaining euphorine genera. He included 32 genera in Euphorinae.

The monophyly of the subfamily Euphorinae is indicated by the following synapomorphies: loss of the final ectoparasitic phase in larval development, short, simple, toothless mandible and disc-shaped antenna of larvae; development of parasitism of adults; reduction of tergal setae to a single subapical row per tergite; reduction of the maxillary palpi to 5 segments or less and strong curvature of the apical radial segment (Capek, 1970; Achterberg, 1984; Shaw, 1985).

Most braconid subfamilies are restricted to parasitism of a single host order, but the euphorines have been associated with seven: Orthoptera, Hemiptera, Psocoptera, Neuroptera, Coleoptera, Lepidoptera and Hymenoptera. The unusual feature of parasitism of adult insects is common within the Euphorinae (Shaw, 1985).

The euphorine fauna of Taiwan is poorly studied now, only 6 genera and 5 species are recorded (Papp, 1962, 1965; Chou, 1980, 1981, 1986; Chiu et al., 1981). In this paper 10 genera and 8 species are added to the euphorine fauna of Taiwan. All the specimens used in this study are deposited in the insect collection of the Taiwan Agricultural Research Institute.

Synoptic list of genera

(Those marked with an asterisk are new records for Taiwan)

Tribe Perilitini Foerster
**Perilitus* Nees

Tribe Microctonini Shaw
**Microctonus* Wesmael

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Tribe Dinocampini Shaw
Centistina Enderlein
Dinocampus Foerster
Tribe Euphorini Foerster
Chrysopophthorus Goidanich
**Wesmaelia* Foerster
Aridelus Marshall
Leiophron Nees
**Holdawayella* Loan
**Euphoriella* Ashmead
**Streblocera* Westwood
Tribe Centistini Capek
**Centistes* Haliday
Tribe Loxocephalini Shaw
Loxocephalus Foerster
Tribe Cosmophorini Muesebeck & Walkley
**Cosmophorus* Ratzeburg
Tribe Syntretini Shaw
Syntretomorpha Papp
**Syntretus* Foerster

Key to genera of Euphorinae and Meteorinae of Taiwan

(Modified from Shaw, 1985)

1. Second intercubitus of fore wing present, thus second cubital cell present, variously shaped. 2
– Second intercubitus of fore wing absent, thus second cubital cell absent. 4
2. Petiole more than 3 times broader apically than basally, not fused below, the sides sometimes meeting medially or through entire basal half; mandibles overlapping for at most half mandible length. . . . . ***Meteorus***
– Petiole nowhere more than 3 times basal width, fused below; mandibles overlapping for at least 3/4 mandible length. 3
3. Mesonotum areolate, obscuring the notauli; shortest distance between eyes of female greater than clypeus width; malar suture absent. . . . . ***Aridelus***
– Mesonotum punctate, the notauli distinct; shortest distance between eyes of female equal to or less than clypeus width; malar suture present. . . . . ***Chrysopophthorus***
4. Basal width of petiole euqal to or greater than half propodeum width; glymma present as a deep basal pit; petiolar spiracles anterior to middle; radius fully developed. . . . . ***Centistes***
– Basal width of petiole less than half propodeum width; glymma absent or, if present then only a shallow depresion and located nearer to middle of petiole; petiolar spiracles near middle or behind middle, or if anterior to middle then glymma absent and radius partly effaced. . 5
5. First cubital abscissa present, or if absent then first intercubitus and recurrent vein also absent. 6
– First cubital abscissa absent, first intercubitus and recurrent vein present. 12
6. Petiole apically at least 4 times broader than basal width, sculptured dorsally, not fused ventrally. 7
– Petiole apically at most 3 times broader than basal width, sculptured or smooth dorsally, sometimes fused ventrally. 9
7. Scape length twice scape width or less. . . . . ***Perilitus***
– Scape length 3 times scape width or greater. 8
8. Petiolar sculpture rugo-punctate. . . . . ***Dinocampus***
– Petiolar sculpture costate. . . . . ***Centistina***
9. Radius fully developed and distinct throughout its length; first cubital abscissa, if present, straight; nervulus postfurcal relative to basal vein. 10
– Radius at least partly effaced apically with some portion absent; first cubital abscissa curved; nervulus intersitial with basal vein. 11

10. Petiole not fused ventrally or fused only basally. ..... ***Leiophron***
– Petiole entirely fused ventrally. ..... ***Wesmaelia***
11. Petiole smooth and polished dorsally; propodeum with a postero-medial depression; shortest distance between eyes greater than clypeus width; eyes apparently glabrous; malar suture absent. ..... ***Holdawayella***
– Petiole sculptured dorsally; propodeum without a postero-medial depression; shortest distance between eyes less than clypeus width; eyes minutely, but distinctly, setose; malar suture short. ..... ***Euphoriella***
12. Tarsal claws cleft; brachius absent; medius absent; petiole entirely fused ventrally. 13
– Tarsal claws simple; brachius sclerotized or at least infumate in basal 1/3–1/2; medius present; petiole not fused ventrally or fused only basally. 14
13. Notauli present; mesonotum punctate; fronto-clypeal suture effaced, not even indicated by a depression. ..... ***Syntretomorpha***
– Notauli absent; mesonotum smooth and shining at least apically; fronto-clypeal suture present, at least indicated by a depression. ..... ***Syntretus***
14. Mandibles nearly as wide apically as basal width, with an oral incision between clypeus and mandibles even when mandibles closed; scrobes prominent, anterior margin raised in two sharp points. ..... ***Cosmophorus***
– Mandibles gradually narrower apically, or without an oral incision when mandibles closed; scrobes not prominent, or if so then margin even and without points. 15
15. Scape length 5 times scape width or greater. ..... ***Streblocera***
– Scape length twice scape width or less. 31
16. Eyes of female bulging anteriorly beyond frons; metafemur length/width greater than 6; abdomen beyond petiole compressed, less than half as wide as prepodeum; vertex and mesonotum rugulose. ..... ***Loxocephalus***
– Eyes of female not bulging beyond frons; metafemur length/width less than 6; abdomen beyond petiole not compressed, about as wide as propodeum; vertex and mesonotum punctate. ..... ***Microctonus***

Genus **ARIDELUS** Marshall

Aridelus Marshall, 1887. Trans. Ent. Soc. London 1887:66.
Type species: *Aridelus bucephalus* Marshall. Monobasic.
Helorimorpha Schmiedeknecht, 1907. Hym. Mitteleuropas, p. 523.
Type species: *Helorimorpha egregia* Schmiedeknecht. Monobasic.
Strictometeorus Cameron, 1909. Soc. Ent. Steglitz 24:9.
Type species: *Strictometeorus rufus* Cameron. Monobasic.
Erythrometeorus Cameron, 1911. Timehri: J. R. Agr. & Commerc. Soc. British Guiana 1:317.
Type species: *Erythrometeorus reticulatus* Cameron. Monobasic.
Scipolabia Enderlein, 1920. Arch. f. Naturgesch. 84:220.
Type species: *Scipolabia reticulata* Enderlein. Original designation.
Arideloides Papp, 1974. Proc. Hawaiian Ent. Soc. 21:443.
Type species: *Arideloides niger* Papp.

The genus *Aridelus* is characterized by the areolate thoracic sculpture and the pointed apical flagellomere. Its hosts are nymphs and adults of Pentatomidae. More than 31 species have been

recorded in the world. So far as I am aware only one species of this genus have been known to occur in Taiwan. In the present paper are added to the fauna of Taiwan eight other species, of which seven are new to science.

Shaw (1985) indicated the synapomorphies of this genus as follows: shortest distance between eyes greater than clypeus width; median frontal carina extending to median ocellus; interantennal distance 2 times socket width; apical flagellomere pointed; flagellum 16-segmented; malar space 1/4 to 1/2 eye height; malar suture absent; mesonotum, mesopleuron and propodeum mostly areolate; radiella and cubitella present, darkly infumated; ovipositor and sheaths shorter than 1/4 petiole length.

Key to species of *Aridelus* from Taiwan

1. Occiput carina completely margined; median frontal carina distinctly flaky, or frons with two submedian longitudinal carinae. 2
– Occiput carina effaced dorsally; median frontal carina more or less wider and lower 6
2. Head yellowish brown; thorax yellowish brown or dark brown to black. 3
– Head and thorax black. 5
3. Thorax yellowish brown. . . . . ***flavicans*** Chao
– Thorax at least dark brown. 4
4. Intertentorial line 1.3 times tentorial-ocular line; stemmatiacum dark brown. . . . . ***taiwanus*** Chou, sp. nov.
– Intertentorial line 2.8 times tentorial-ocular line; stemmatiacum yellowish brown. . . . . ***longius*** Chou, sp. nov.
5. Recurrent vein distinctly antefurcal; fore wing with 2 fuscous bands. . . . . ***rutilipes*** Papp
– Recurrent vein interstitial or postfurcal; fore wing without fuscous band. . . . . ***reticulatus*** Chou, sp. nov.
6. First flagellomere 2.6 times as long as its basal width; preapical flagellomere as long as its width. . . . . ***tsuifengensis*** Chou, sp. nov.
– First flagellomere more than 3.3 times as long as its basal width; preapical flagellomere longer than its width. 7
7. First flagellomere 4.4 times as long as its basal width; dorsal length of eye 1.0 times temple. . . . . ***antennatus*** Chou, sp. nov.
– First flagellomere 3.3–3.7 times as long as its basal width; dorsal length of eye 1.6 times temple. 8
8. Intertentorial line 2.2–2.8 times tentorial-ocular line; 2nd intercubitus postfurcal. . . . . ***destitutus*** Chou, sp. nov.
– Intertentorial line 1.7 times tentorial-ocular line; 2nd intercubitus interstitial. . . . . ***tungpuensis*** Chou, sp. nov.

Aridelus rutilipes Papp
(Figs. 6, 15, 24, 33, 42, 51, 60, 69, 78, 87)

Aridelus rutilipes Papp, 1965. Acta Zool. Hung. 11(1–2):187. – – Chao, 1974. Acta Ent. Sinica 17(4):455.

Female: Head 1.8 times as broad as its length and 1.2 times broader than mesonotum, hairy; dorsal length of eye 1.0 times temple. Malar space 0.45 times as long as eye height. Intertentorial line 2.0 times tentorial-ocular line. Face 0.6 times as high as its breadth and 0.6 times as wide as

head. Clypeus and face punctulate; frons somewhat punctate-reticulate, median frontal carina flaky; vertex and temple densely punctate. Occiput carina completely margined. Distance between hind ocelli 0.5 times the distance between hind ocellus and eye; and 2.0 times the width of hind ocellus. First flagellomere 4.8 times as long as its basal width and 1.2 times as long as 2nd; preapical segment 1.8 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.7 times as long as stigmal length. Second intercubitus postfurcal, recurrent vein distinctly antefurcal. Petiole 5.6 time as long as apical width. Petiole and the following tergites smooth and shining.

Black; mandible brownish, more or less darker basally, apex of mandible brown, palpi yellowish. Antenna and legs brownish, apex of flagellum darker, 5th tarsi and claws darker. Tegula brown. Wings hyaline with two fuscous bands; stigma and veins dark brown. Ovipositor sheath black.

Length: Body, 4.8–6.2 mm; antenna, 3.6–4.2 mm; fore wing, 3.9–4.5 mm; ovipositor sheath, 0.5 mm.

Male: Simliar to the female.

Specimens examined: Paling 800 m, Taoyuan, 2♀, 3–5. V. 1983 (K. C. Chou & C. C. Pan). Kukuan 730 m, Taichung, 1♀, 14–17. X. 1980 (K. S. Lin & C. H. Wang). Chiapaotai 750 m, Taichung, 3♀, 1♂, 14–18. X. 1980 (K. S. Lin & C. H. Wang). Meifeng 2,150 m, Nantou, 1♀, 5–9. X. 1980 (C. C. Chen & C. C. Chien). Tungpu 1,200 m, Nantou, 1♂, 25–29. IX. 1980 (L. Y. Chou & T. Lin), 2♂, 5–8. X. 1981 (T. Lin & W. S. Tang), 2♀, 1♂, 18–23. XI. 1981 (T. Lin & W. S. Tang), 1♀, 2♂, 19–23. VII. 1982 (L. Y. Chou & T. Lin), 1♀, 18–21. X. 1982 (K. C. Chou & S. C. Lin), 1♀, 1♂, 22–25. XI. 1982 (K. C. Chou & S. P. Huang), 3♂, 10–14. I. 1983 (K. C. Chou & S. P. Huang), & 2♀, 20–24. VI. 1983 (K. C. Chou & C. Y. Wong).

The specimens examined differs from Papp's original description (1965) of *A. rutilipes* Papp in the radius distinct in almost all the specimens except 1 male specimen colorless. But I think these specimens may be conspecific with *A. rutilipes* Papp.

Aridelus flavicans Chao
(Figs. 3, 12, 21, 30, 39, 48, 57, 66, 75, 84)

Aridelus flavicans Chao, 1974. Acta Ent. Sinica 17(4):455.

Female: Head 1.9 times as broad as its length and 1.2 times broader than mesonotum, hairy; dorsal lenghth of eye 1.2 times temple. Malar space 0.55 times as long as eye height. Intertentorial line 1.4 times tentorial-ocular line. Face 0.5 times as high as its breadth and 0.6 times as wide as head. Clypeus densely punctate, face densely punctate to slightly rugulose above; frons somewhat punctate-reticulate, median frontal carina flaky; vertex and temple densely punctate. Occiput carina completely margined. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 1.8 times the width of hind ocellus. First flagellomere 3.8 times as long as its basal width and 1.3 times as long as 2nd; preapical segment 1.2 times as long as wide.

Thorax and propodeum areolate; scutellum rather smooth. Radius distinct; radial cell 0.7 times as long as stigmal length. Second intercubitus postfurcal, recurrent vein weakly antefurcal to postfurcal. Petiole 6.0 times as long as apical width. Petiole and the following tergites smooth and shining.

Yellowish brown; apex of mandible brown, gaster dark brown. Antenna brownish. Legs yellowish brown; claws darker. Wings hyaline, stigma dark brown; veins pale yellow, radius more or

less darker. Ovipositor sheath dark brown.

Length: Body, 5.1 mm; antenna, 2.7 mm; fore wing, 3.2 mm; ovipositor sheath, 0.4 mm.

Male: Similar to the female.

Specimens examined: Wushe 1,150 m, Nantou, 1♂, 26–28. VIII. 1981 (L. Y. Chou & S. C. Lin), 1♀, 30. VIII.-2. IX. 1982 (L. Y. Chou & K. C. Chou), 1♀, 4. VIII. 1984 (K. S. Lin), & 4♀, 17. VIII. 1984 (K. C. Chou). Tungpu 1,200 m, Nantou, 2♀, 20–24. VI. 1983 (K. C. Chou & C. Y. Wong), & 2♀, 23–27. VII. 1984 (K. C. Chou & C. H. Yang).

This species is new to Taiwan. The specimens examined differ from Chao's original description (1974) in the intertentorial line 1.4 times tentorial-ocular line and the recurrent vein weakly antefurcal to postfurcal.

Aridelus taiwanus Chou, sp. nov.
(Figs. 7, 16, 25, 34, 43, 52, 61, 70, 79, 88)

Female: Head 2.0 times as broad as its length and 1.1–1.2 times broader than mesonotum, hairy; dorsal length of eye 1.3–1.4 times temple. Malar space 0.6 times as long as eye height Intertentorial line 1.3 times tentorial-ocular line. Face 0.5 times as high as its breadth and 0.6 times as wide as head. Clypeus and face punctulate; frons somewhat densely punctate, median frontal carina flaky; vertex and temple rather sparsely punctate. Occiput carina completely margined. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 1.6 times the width of hind ocellus. First flagellomere 3.9–4.2 times as long as its basal width and 1.1 times as long as 2nd; preapical segment 1.8 times as long as wide.

Thorax and propodeum areolate, scutellum rather smooth. Radius distinct; radial cell 0.7 times as long as stigmal length. Second intercubitus and recurrent vein postfurcal. Petiole 5.6 times as long as apical width. Petiole and the following tergites smooth and shining.

Black; head yellowish brown, frons and vertex dark brown medially, or stemmaticum dark brown only, apex of mandible brown, petiole yellowish brown. Antenna dark, scape and pedicel yellowish brown; or antenna yellowish brown, 13th flagellomere more or less darker, last 3 segments dark brown. Legs yellowish brown; claws darker. Tegula yellowish. Wings hyaline with only one slightly fuscous band; stigma dark brown; veins pale yellow, radius, 2nd and 3rd abscissa of cubitus, and intercubiti darker. Ovipositor sheath black.

Length: Body, 4.8–5.4 mm; antenna, 3.9–4.1 mm; fore wing, 4.2–4.5 mm; ovipositor sheath, 0.4 mm.

Male: Head yellowish brown to brownish, face with dark brown bands centrally, frons and vertex dark brown medially. Antenna dark brown, scape and pedicel yellowish brown to brownish. The fuscous band of fore wing darker than female. Recurrent vein postfurcal or interstitial.

Holotype: ♀, Tsuifeng 2,300 m, Nantou, 23. V. 1982 (L. Y. Chou). Paratypes: Sungkang 2,100 m, 1♂, IX. 1985 (K. S. Lin), Tayuling 2,560 m, Hualien, 1♀, 9–16. VI. 1980 (K. S. Lin & B. H. Chen), & 1♂, 10–15. IX. 1980 (K. S. Lin & C. H. Wang).

This species very similar to *A. sinensis* Wang (Wang, 1981), but differs from it by the body larger, petiole yellowish brown.

Etymology: Named after Taiwan.

Aridelus longius Chou, sp. nov.
(Figs. 4, 13, 22, 31, 40, 49, 58, 67, 76, 85)

Female: Head 1.8 times as broad as its length and 1.1 times broader than mesonotum, hairy;

dorsal length of eye 1.3 times temple. Malar space 0.33 times as long as eye height. Intertentorial line 2.8 times tentorial-ocular line. Face 0.6 times as high as its breadth and 0.5 times as wide as head. Clypeus, face and frons somewhat sparsely, minutely punctate, median frontal carina flaky; vertex and temple sparsely punctate. Occiput carina completely margined. Distance between hind ocelli 0.3 times the distance between hind ocellus and eye; and 1.8 times the width of hind ocellus. First flagellomere 3.5 times as long as its basal width and 1.2 times as long as 2nd; preapical segment 1.6 times as long as wide.

Thorax and propodeum areolate; scutellum rather smooth. Radius distinct; radial cell 0.6 times as long as stigmal length. Second intercubitus and recurrent vein postfurcal. Petiole 4.3 times as long as apical width. Petiole and the following tergites smooth and shining.

Dark brown; head and petiole yellowish, apex of mandible brown. Antenna brownish. Legs yellowish brown; claws darker. Tegula yellowish brown. Wings hyaline, stigma dark brown, veins pale yellow to brownish. Ovipositor sheath dark brown.

Length: Body, 3.4 mm; antenna, 2.2 mm; fore wing, 2.5 mm; ovipositor sheath, 0.2 mm.

Male: Similar to the female.

Holotype: ♀ Tungpu 1,200 m, Nantou, 23–27. VII. 1984 (K. C. Chou & C. H. Yang). Paratypes: Tungpu 1,200 m, Nantou, 1♂, 25–29. IX. 1980 (L. Y. Chou & T. Lin), & 1♀, 20–24, VI. 1983 (K. C. Chou & C. Y. Wong).

This species simiar to *A. taiwanus*, sp. nov. but differs from it by the body smaller, intertentorial line longer and malar space shorter.

Etymology: The name of the new species, *longius* (Latin), refers to its intertentorial line longer.

Aridelus reticulatus Chou, sp. nov.
(Figs. 5, 14, 23, 32, 41, 50, 59, 68, 77, 86)

Female: Head 1.8 times as broad as its length and 1.1 times broader than mesonotum, hairy; dorsal length of eye 1.5 times temple. Malar space 0.41 times as long as eye height. Intertentorial line 2.0 times tentorial-ocular line. Face 0.6 times as high as its breadth and 0.4 times as wide as head. Clypeus densely punctate; face slightly punctate-reticulate; frons and vertex reticulate-rugose, frons with two somewhat wider and lower carinae medially; temple somewhat sparsely punctate. Occiput carina completely developed. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 2.0 times the width of hind ocellus. First flagellomere 3.8 times as long as its basal width and 1.3 times as long as 2nd; preapical segment 1.2 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.7 times as long as stigmal length. Second intercubitus postfurcal, recurrent vein interstitial or postfurcal. Petiole 5.8 times as long as apical width. Petiole and the following tergites smooth and shining.

Blackish; head and petiole lighter, clypeus brownish, mandible and palpi yellowish brown, apex of mandible brown. Antenna yellowish brown to light brown. Legs yellowish brown; hind femur light brown, claws darker. Tegula yellowish brown. Wings hyaline, stigma dark brown; veins pale yellow, radius, 2nd and 3rd abscissa of cubitus, and intercubiti darker. Ovipositor sheath dark brown.

Length: Body, 4.0 mm; antenna, 2.2 mm; fore wing, 2.7 mm.

Male: Similar to the female, except the petiole and hind femur yellowish brown.

Holotype: ♀, Wushe 1,150 m, Nantou, 30. VIII.-2. IX. 1982 (L. Y. Chou & K. C. Chou). Paratypes: Tungpu 1,200 m, Nantou, 2♀, 18–20. X. 1982 (K. C. Chou & S. C. Lin); & Fuli, Hualien – Tungho, Taitung, 1♂, 9–11. XI. 1982 (K. C. Chou & S. P. Huang).

This species similar to *A. rutilipes* Papp, but differs from it by the fore wing without fuscous bands and the body smaller.

Etymology: The name of the new species, *reitculatus* (Latin), refers to its frons reticulate-rugose.

Aridelus destitutus Chou, sp. nov.

(Figs. 2, 11, 20, 29, 38, 47, 56, 65, 74, 83)

Female: Head 1.9 times as broad as its length and 1.1 times broader than mesonotum, hairy; dorsal length of eye 1.6 times temple. Malar space 0.37–0.41 times as long as eye height. Intertentorial line 2.1–2.8 times tentorial-ocular line. Face 0.6 times as high as its breadth and 0.5 times as wide as head. Clypeus and face densely punctate; frons punctate-reticulate, median frontal carina somewhat wider and lower; vertex and temple somewhat sparsely punctate. Occiput carina effaced dorsally. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 1.6 times the width of hind ocellus. First flagellomere 3.3 times as long as its basal width and 1.3 times as long as 2nd; preapical segment 1.1 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.5 times as long as stigmal length. Second intercubitus and recurrent vein postfurcal. Petiole 6.2 times as long as apical width. Petiole and the following tergites smooth and shining.

Black; clypeus brownish, mandible yellowish brown, apex of mandible brown, palpi yellowish brown. Antenna brownish, darker toward apex. Legs yellowish brown; hind femur dark brown, claws brown. Tegula yellowish brown. Wings hyaline, stigma dark brown; veins pale yellow; radius, 2nd and 3rd abscissa of cubitus and intercubiti darker. Ovipositor sheath dark brown.

Length: Body, 3.8 mm; antenna, 1.7 mm; fore wing, 2.4 mm.

Male: Similar to the female.

Holotype: ♀, Wushe 1,150 m, Nantou, 6. XI. 1981 (S. C. Lin & W. S. Tang). Paratypes: Chihnan temple, Taipei, 1♀, 17. X. 1961 (S. C. Chiu); Nankang, Taipei, 1♀, 20. X. 1961 (W. H. Ting); Taipei, 1♀, 1♂, 9–25. I, 1♂, 1–12. VII, 1♂, 15–24. VII, 2♀, 3♂, VIII, 1♀, 3♂, 2–7. IX, 2♀, 5♂, 15–30. IX, 3♂, 1–15. X, 3♀, 3♂, 16–31. X, 2♀, 7♂, 4–19. XI, 4♀, 3♂, 20–30. XI, 7♂, 6–15. XII, & 1♂, 20–30. XII. 1963 (K. S. Lin). Wufeng 400 m, Hsinchu, 1♀, 14–16. VII. 1982 (K. C. Chou & C. C. Pan). Chiapaotai 750 m, Taichung, 1♀, 1♂, 14–18. X. 1980 (K. S. Lin & C. H. Wang). Kukuan 730 m, Taichung, 1♀, 20–22. VI. 1978 (K. S. Lin & K. C. Chou), & 1♂, 14–17. X. 1980 (K. S. Lin & C. H. Wang). Tungpu 1,200 m, 1♀, 25–29. IX. 1980 (L. Y. Chou & T. Lin), 1♀, 5–8. X. 1981 (T. Lin & W. S. Tang), 1♀, 1♂, 18–21. X. 1982 (K. C. Chou & S. C. Lin), 1♀, 22–25. XI. 1982 (K. C. Chou & S. P. Huang), & 1♀, 20–24. VI. 1983 (K. C. Chou & C. Y. Wong). Meifeng 2,150 m, Nantou, 1♂, 20–22. VI. 1979 (K. S. Lin & B. H. Chen). Wushe 1,150 m, Nantou, 1♀, 6–11. V. 1981 (K. S. Lin & S. C. Lin), 1♀, 6. XI. 1981 (S. C. Lin & W. S. Tang), 1♀, 1♂, 7. V. 1984 (K. C. Chou & C. C. Pang), & 2♀, 17. VII. 1984 (K. C. Chou). Santimen, Pingtung, 1♂, 28. III.-1. IV. 1981 (C. C. Chen & C. C. Pang), & 1♂, 31. I.-4. II. 1983 (K. C. Chou & S. P. Huang). Fuli, Hualien – Tungho, Taitung, 2♀, 9–11. XI. 1982 (K. C. Chou & S. P. Huang).

This species similar to *A. nigricans* Chao (Chao, 1974), but differs from it in the head less transverse.

Etymology: The name of the new species, *destitutus* (Latin), refers to its occiput carina effaced dorsally.

Aridelus tsuifengensis Chou, sp. nov.
(Figs. 8, 17, 26, 35, 44, 53, 62, 71, 80, 89)

Female: Head 1.9 times as broad as its length and 1.1 times broader than mesonotum, hairy; dorsal length of eye 1.0 times temple. Malar space 0.53 times as long as eye height. Intertentorial line 1.7–1.9 times tentorial-ocular line. Face 0.5 times as high as its breadth and 0.6 times as wide as head. Clypeus densely punctate; face densely punctate, slightly rugose; frons strigate-punctate, median frontal carina rather wider and lower; vertex and temple somewhat sparsely punctate. Occiput carina effaced dorsally. Distance between hind ocelli 0.3 times the distance between hind ocellus and eye; and 1.6 times the width of hind ocellus. First flagellomere 2.6 times as long as its basal width and 1.1 times as long as 2nd; preapical segment 1.0 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.5 times as long as stigmal length. Second intercubitus and recurrent vein postfurcal. Petiole 5.7 times as long as apical width. Petiole and the following tergites smooth and shining.

Dark brown; clypeus lighter, thorax darker, mandible yellowish brown, apex of mandible brown, palpi yellowish brown. Antenna yellowish brown to brown, darker toward apex. Legs yellowish brown; hind femur of paratype dark brown, claws dark brown. Tegula brownish. Wings hyaline, stigma dark brown, veins slightly brownish. Ovipositor sheath dark brown.

Length: Body, 3.6 mm; antenna, 2.3 mm; fore wing, 2.6 mm.

Male: Unknown.

Holotype: ♀, Tsuifeng 2,300 m, Nantou, 1–3. VIII. 1981 (T. Lin & W. S. Tang). Paratype: Tayuling 1,560 m, Hualien, 1♀, 12–15, IX. 1980 (K. S. Lin & C. H. Wang).

This species differs from other Taiwanese species of *Aridelus* in the preapical flagellomere almost as long as wide.

Etymology: Named after Tsuifeng, the type locality of this new species.

Aridelus antennatus Chou, sp. nov.
(Figs. 1, 10, 19, 28, 37, 46, 55, 64, 73, 82)

Female: Head 2.0 times as broad as its length and 1.1 times broader than mesonotum, hairy; dorsal length of eye 1.0 times temple. Malar space 0.42 times as long as eye height. Intertentorial line 2.1 times tentorial-ocular line. Face 0.6 times as high as its breadth and 0.5 times as wide as head. Clypeus somewhat sparsely punctate; face densely punctate; frons and vertex somewhat punctate-reticulate, rather smooth toward sides, median frontal carina somewhat wider and lower; temple somewhat sparsely punctate. Occiput carina effaced dorsally. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 1.6 times the width of hind ocellus. First flagellomere 4.4 times as long as its basal width and 1.4 times as long as 2nd; preapical segment 1.4 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.5 times as long as stigmal length. Second intercubitus interstitial, recurrent vein postfrucal. Petiole 6.6 times as long as apical width. Petiole and the following tergites smooth and shining.

Dark brown; clypeus lighter, mandible yellowish brown, apex of mandible brown, palpi yellowish brown, petiole yellowish brown. Antenna brownish. Legs yellowish brown; claws dark brown. Tegula brownish. Wings hyaline, stigma dark brown, veins pale yellow. Ovipositor sheath dark brown.

Length: Body, 3.5 mm; antenna, 2.1 mm; fore wing, 2.4 mm.

Male: Unknown.

Holotype: ♀, Wushe 1,150 m, Nantou, 11–15. IX. 1984 (K. S. Lin).

This species similar to *A. tungpuensis*, sp. nov., but differs from it by the relative length of eye and temple in dorsal view and the shape of flagellum.

Etymology: The name of the new species, *antennatus* (Latin), refers to its shape of antenna.

Aridelus tungpuensis Chou, sp. nov.
(Figs. 9, 18, 27, 36, 45, 54, 63, 72, 81, 90)

Female: Head 2.0 times as broad as its length and 1.1 times broader than mesonotum, hairy; dorsal length of eye 1.6 times temple. Malar space 0.46 times as long as eye height. Intertentorial line 1.7 times tentorial-ocular line. Face 0.5 times as high as its breadth and 0.6 times as wide as head. Clypeus and face densely punctate; frons strigate-punctate, median frontal carina somewhat wider and lower; vertex and temple somewhat sparsely punctate. Occiput carina effaced dorsally. Distance between hind ocelli 0.4 times the distance between hind ocellus and eye; and 1.6 times the width of hind ocellus. First flagellomere 3.7 times as long as its basal width and 1.2 times as long as 2nd; preapical segment 1.2 times as long as wide.

Thorax and propodeum areolate. Radius distinct; radial cell 0.5 times as long as stigmal length. Second intercubitus interstitial, recurrent vein postfurcal. Petiole 5.9 times as long as apical width. Petiole and the following tergites smooth and shining.

Black, mandible yellowish brown, apex of mandible brown, palpi yellowish brown. Antenna brownish, darker toward apex. Legs yellowish brown; hind femur dark brown, claws brown. Tegula yellowish brown. Wings hyaline, stigma dark brown; veins pale yellow; radius, 2nd and 3rd abscissa of cubitus and intercubiti darker. Ovipositor sheath dark brown.

Length: Body, 3.7 mm; antenna, 2.2 mm; fore wing, 2.8 mm.

Male: Similar to the female.

Holotype: ♀, 20–24. IV. 1982 (T. Lin & K. C. Chou). Paratypes: Tungpu 1,200 m, Nantou, 2♀, 5♂, 28. IV.-2. V. 1981 (T. Lin & C. J. Lee), 1♀, 18–23. XI. 1981 (T. Lin & W. S. Tang), 4♂, 20–24. IV. 1982 (T. Lin & K. C. Chou), 2♂, 19–23. VII. 1982 (L. Y. Chou & T. Lin), 1♂, 20–24. VI. 1983 (K. C. Chou & C. Y. Wong), 3♂, 16–20. IV. 1984 (K. C. Chou & C. H. Yang), 1♂, 23–27. VII. 1984 (K. C. Chou & C. H. Yang). Wushe 1,150 m, Nantou, 2♀, 6♂, 7. V. 1984 (K. C. Chou & C. C. Pan).

This species very similar to *A. destitutus* sp. nov., but differs from it in the smaller relative length of intertentorial line and tentorial-ocular line, and the first intercubitus interstitial.

Etymology: Name after Tungpu, the type locality of this new species.

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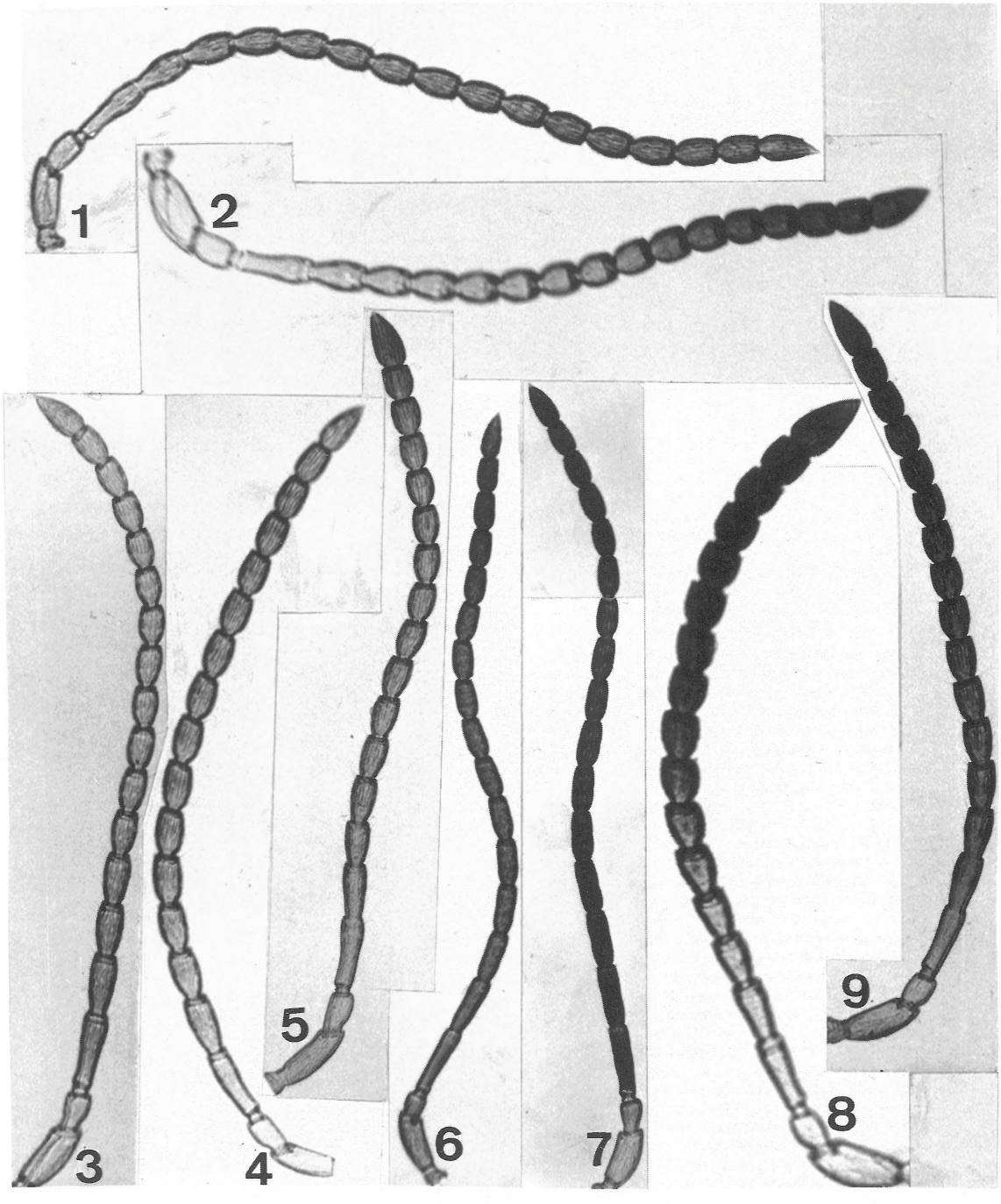
臺灣產椿繭蜂屬之分類

(膜翅目：小繭蜂科：優繭蜂亞科)

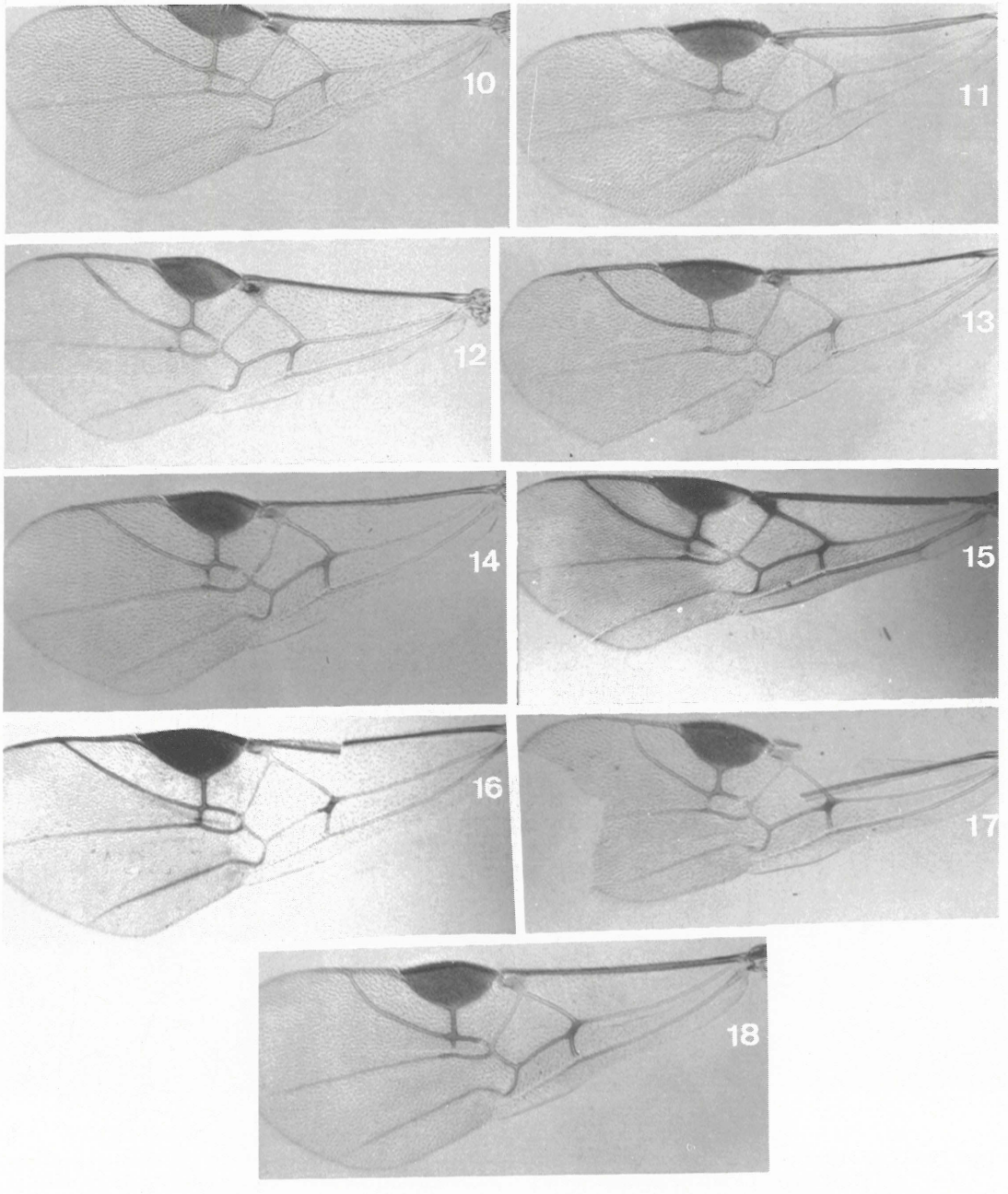
周 樑 鎰

中文摘要

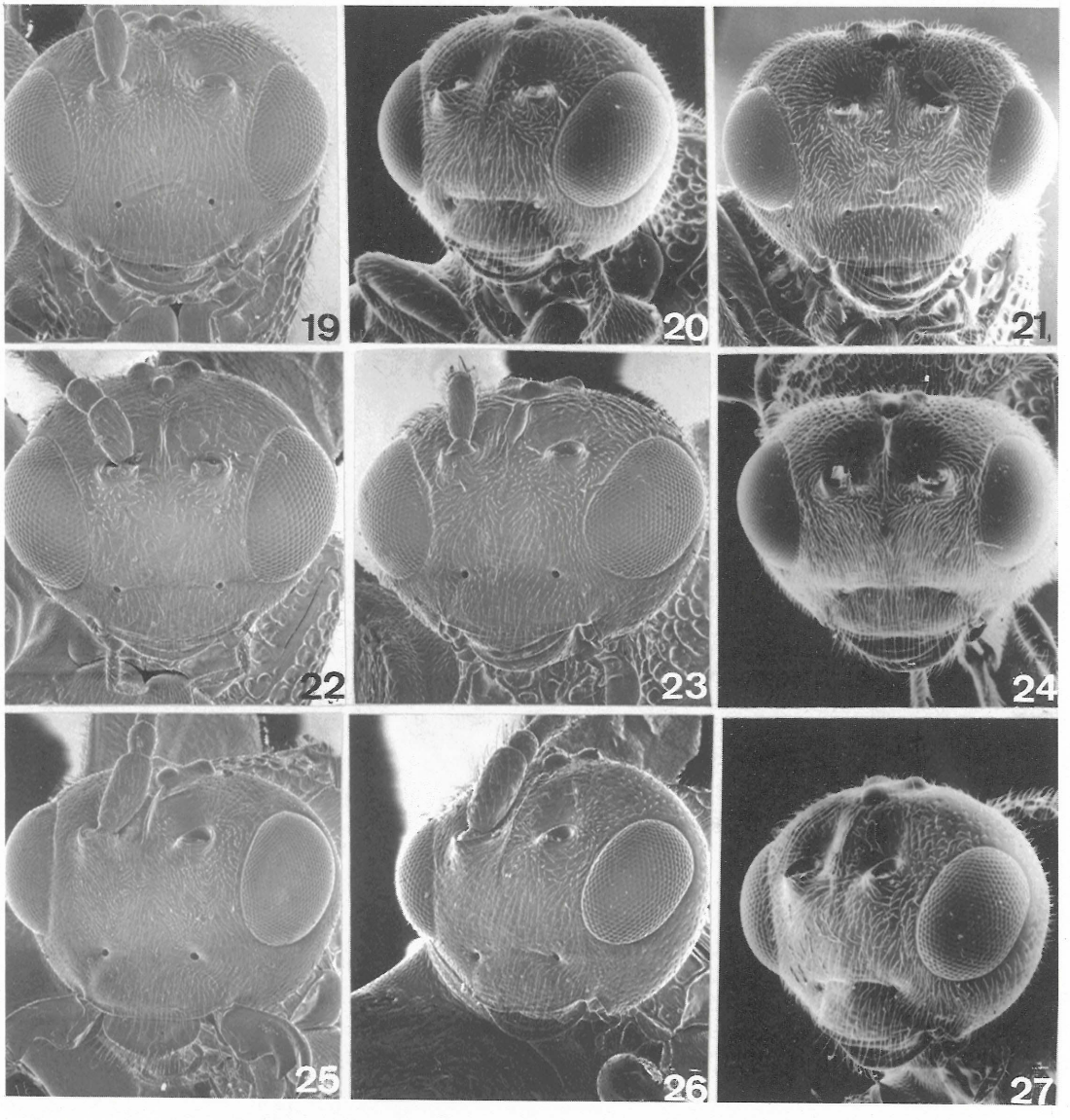
椿繭蜂屬(*Aridelus*)隸膜翅目、小繭蜂科、優繭蜂亞科，乃椿象科若蟲與成蟲期之寄生蜂，全世界已知之種類約30餘種。本文描述臺灣產之9種椿繭蜂，其中 *Aridelus antennatus, A. destitutus, A. longius, A. reticulatus, A. taiwanus, A. tsuifengensis*及*A. tungpuensis*等7種爲新種。*Aridelus flavicans* Chao爲臺灣新記錄。文中並附分種檢索表及特徵圖。此外並附臺灣優繭蜂亞科屬之檢索表，其中10屬爲臺灣新記錄。



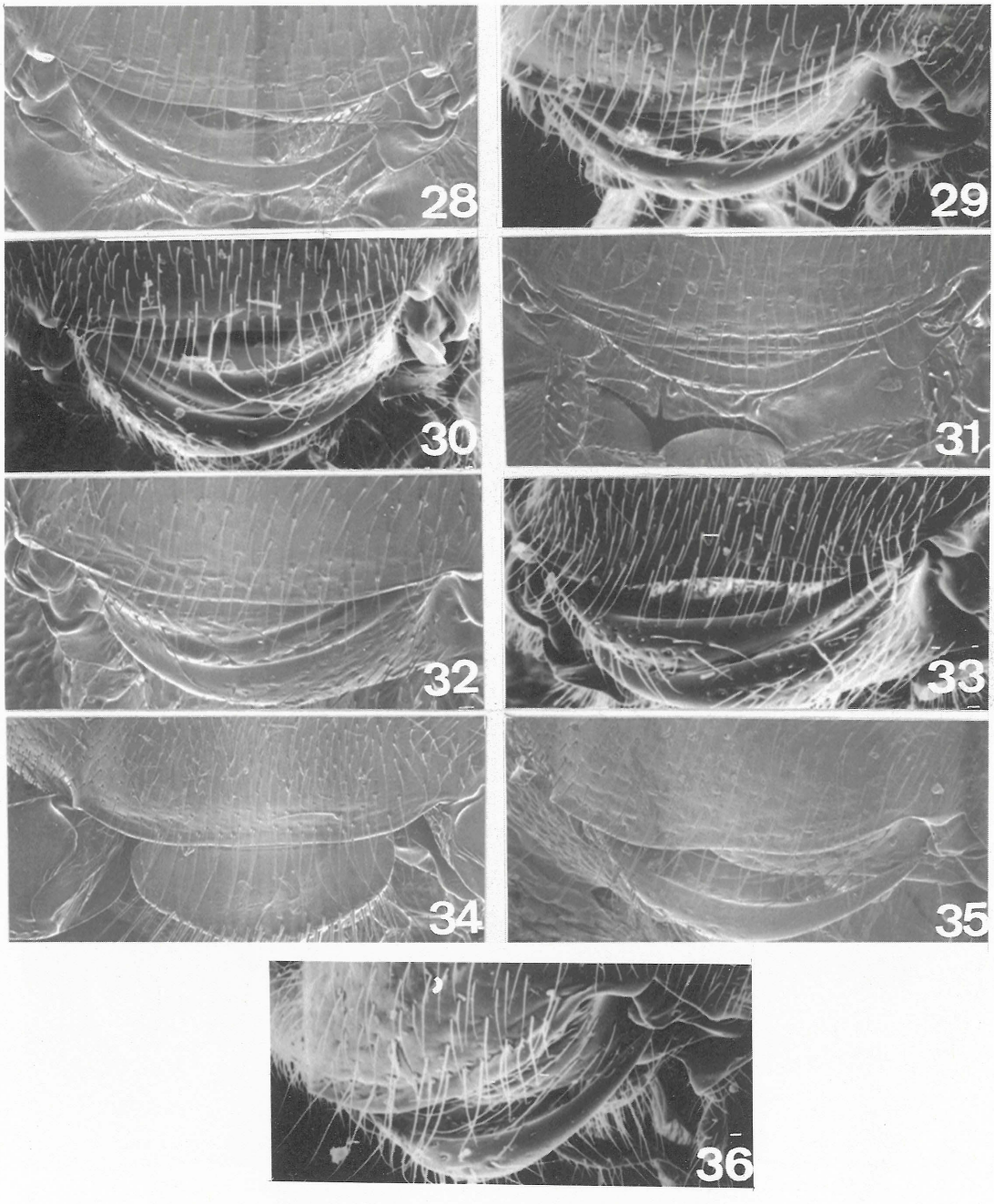
Figs. 1–9, Antennae of *Aridelus* spp. (female): 1, *antennatus* sp. nov.; 2, *destitutus* sp. nov.; 3, *flavicans* Chao; 4, *longius* sp. nov.; 5, *reticulatus* sp. nov.; 6, *rutilipes* Papp; 7, *taiwanus* sp. nov.; 8, *tsuifengensis* sp. nov.; 9, *tungpuensis* sp. nov.



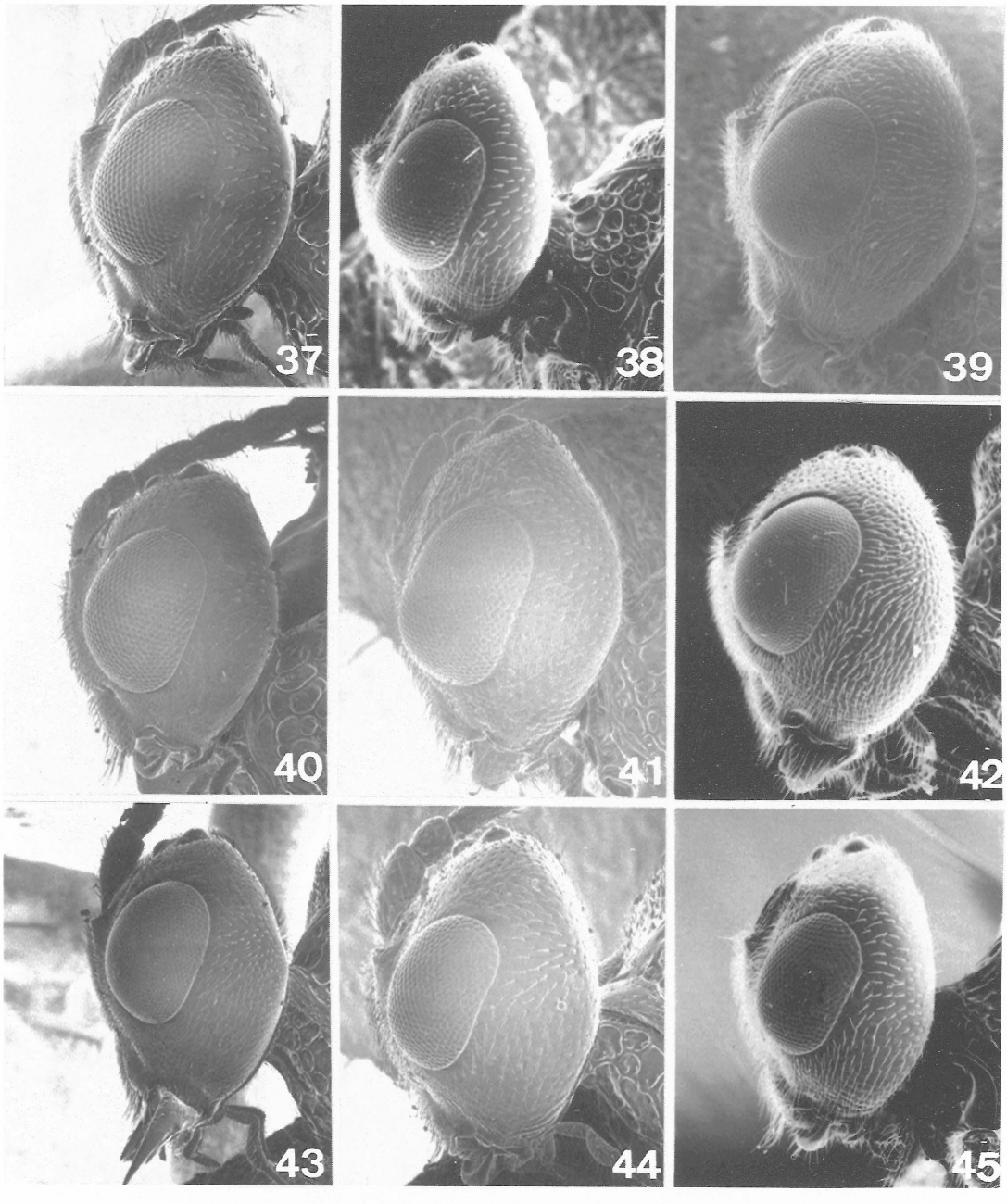
Figs. 10–18, Fore wings of *Aridelus* spp. (female): 10, *antennatus* sp. nov.; 11, *destitutus* sp. nov.; 12, *flavicans* Chao; 13, *longius* sp. nov.; 14, *reticulatus* sp. nov.; 15, *rutilipes* Papp; 16, *taiwanus* sp. nov.; 17, *tsuifengensis* sp. nov.; 18, *tungpuensis* sp. nov.



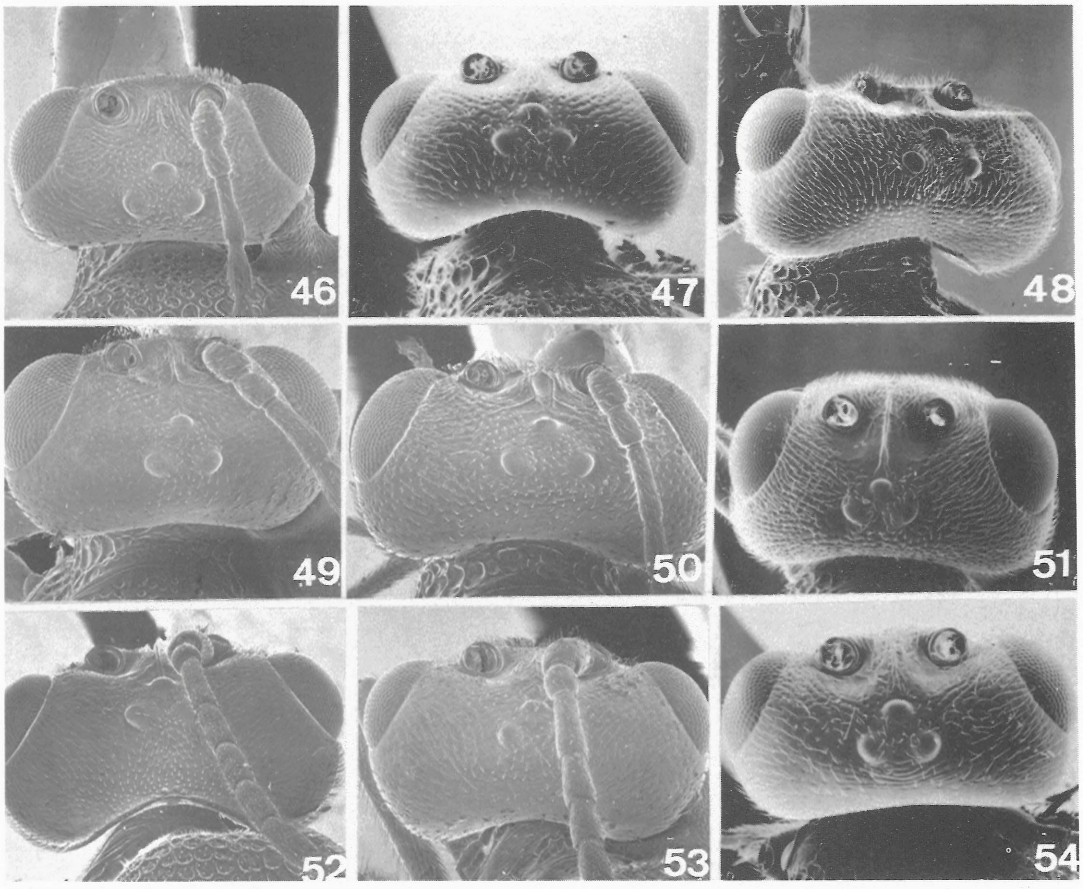
Figs. 19–27, Frontal view of heads of *Aridelus* spp. (female): 19, *antennatus* sp. nov.; 20, *destitutus* sp. nov.; 21, *flavicans* Chao; 22, *longius* sp. nov.; 23, *reticulatus* sp. nov.; 24, *rutilipes* Papp; 25, *taiwanus* sp. nov.; 26, *tsuifengensis* sp. nov.; 27, *tungpuensis* sp. nov.



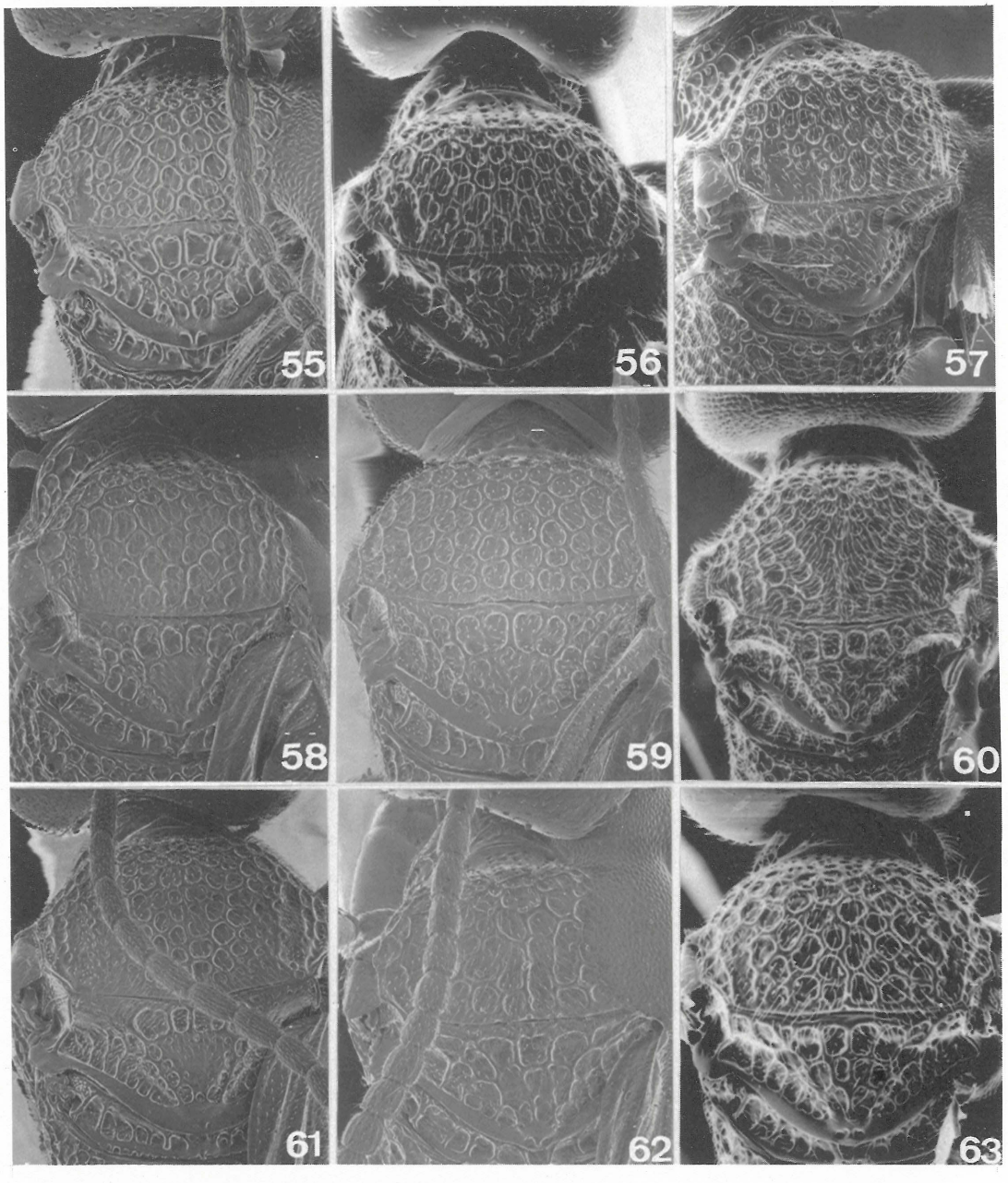
Figs. 28–36, Apex of clypeus of *Aridelus* spp. (female): 28, *antennatus* sp. nov.; 29, *destitutus* sp. nov.; 30, *flavicans* Chao; 31, *longius* sp. nov.; 32, *reticulatus* sp. nov.; 33, *rutilipes* Papp; 34, *taiwanus* sp. nov.; 35, *tsuifengensis* sp. nov.; 36, *tungpuensis* sp. nov.



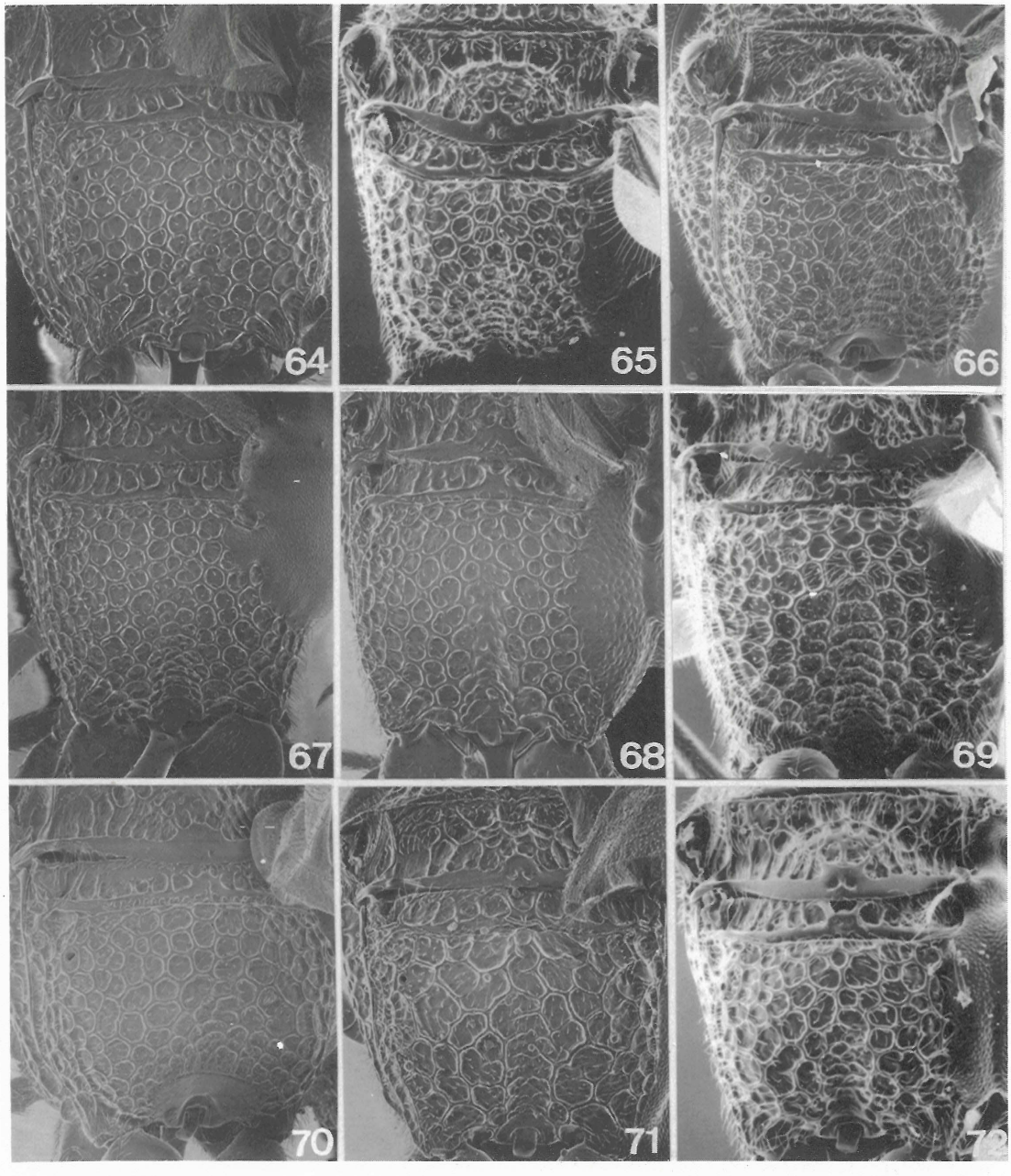
Figs. 37–45, Lateral view of heads of *Aridelus* spp. (female): 37, *antennatus* sp. nov.; 38, *destitutus* sp. nov.; 39, *flavicans* Chao; 40, *longius* sp. nov.; 41, *reticulatus* sp. nov.; 42, *rutilipes* Papp; 43, *taiwanus* sp. nov.; 44, *tsuifengensis* sp. nov.; 45, *tungpuensis* sp. nov.



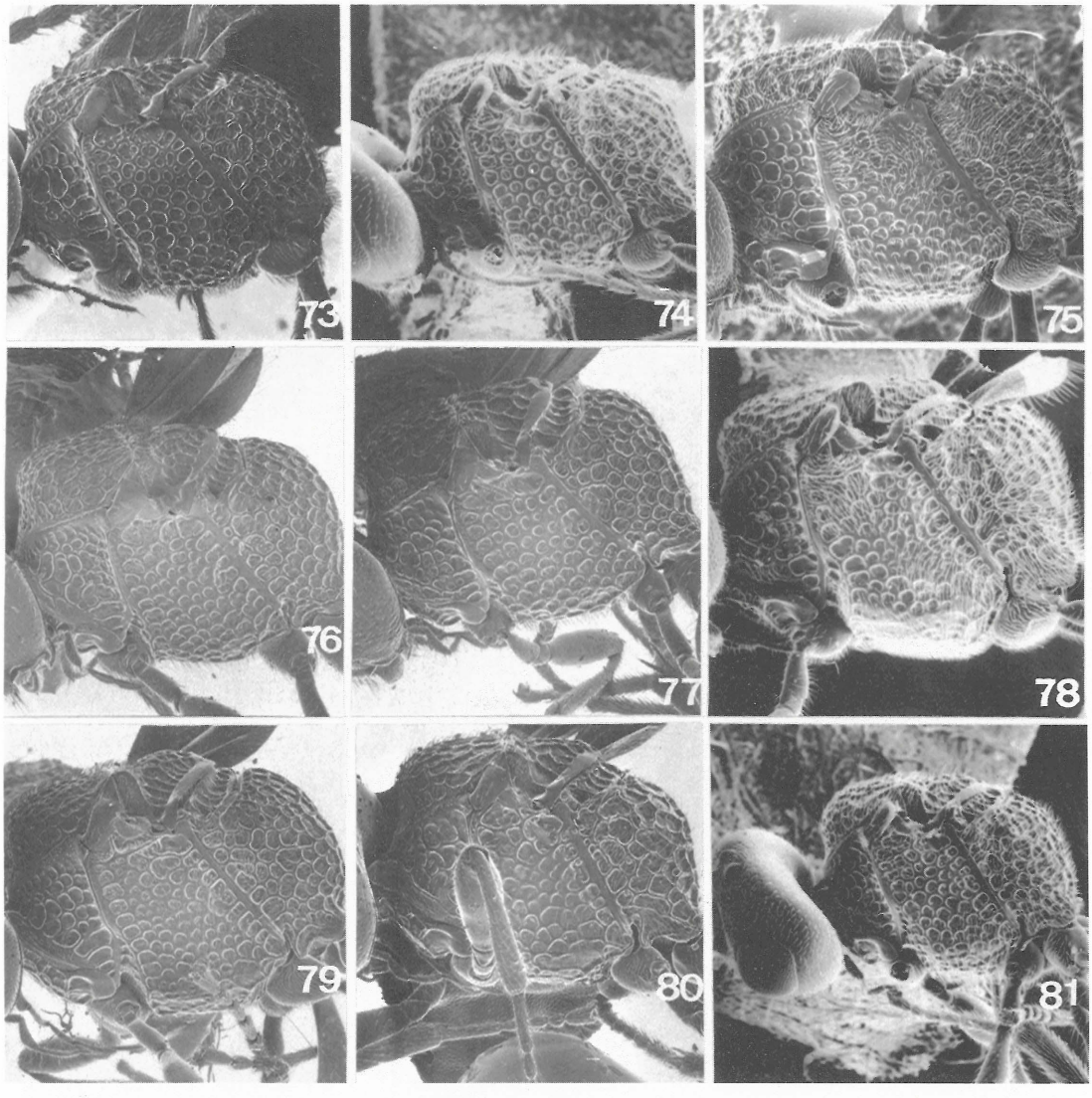
Figs. 46–54, Dorsal view of heads of *Aridelus* spp. (female): 46, *antennatus* sp. nov.; 47, *destitutus* sp. nov.; 48, *flavicans* Chao; 49, *longius* sp. nov.; 50, *reticulatus* sp. nov.; 51, *rutilipes* Papp; 52, *taiwanus* sp. nov.; 53, *tsuifengensis* sp. nov.; 54, *tungpuensis* sp. nov.



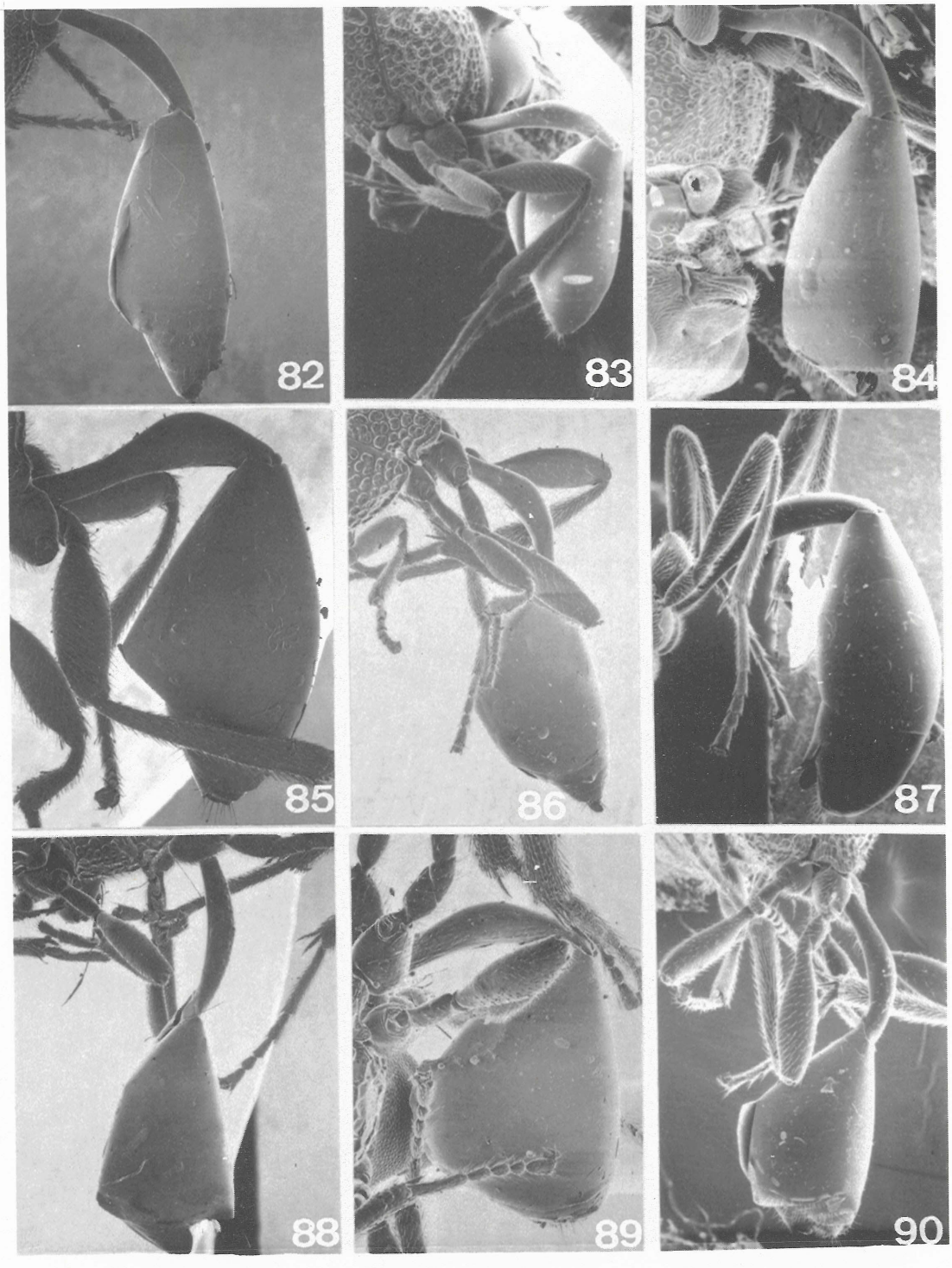
Figs. 55–63, Dorsal view of mesonotums of *Aridelus* spp. (female): 55, *antennatus* sp. nov.; 56, *destitutus* sp. nov.; 57, *flavicans* Chao; 58, *longius* sp. nov.; 59, *reticulatus* sp. nov.; 60, *rutilipes* Papp; 61, *taiwanus* sp. nov.; 62, *tsuifengensis* sp. nov.; 63, *tungpuensis* sp. nov.



Figs. 64–72, Dorsal view of propodeums of *Aridelus* spp. (female): 64, *antennatus* sp. nov.; 65, *destitutus* sp. nov.; 66, *flavicans* Chao; 67, *longius* sp. nov.; 68, *reticulatus* sp. nov.; 69, *rutilipes* Papp; 70, *taiwanus* sp. n.; 71, *tsuifengensis* sp. nov.; 72, *tungpuensis* sp. nov.



Figs. 73–81, Lateral view of thoraces of *Aridelus* spp. (female): 73, *antennatus* sp. nov.; 74, *destitutus* sp. nov.; 75, *flavicans* Chao; 76, *longius* sp. nov.; 77, *reticulatus* sp. nov.; 78, *rutilipes* Papp; 79, *taiwanus* sp. nov.; 80, *tsuifengensis* sp. nov.; 81, *tungpuensis* sp. nov.



Figs. 82–90, Lateral view of abdomens of *Aridelus* spp. (female): 82, *antennatus* sp. nov.; 83, *destitutus* sp. nov.; 84, *flavicans* Chao; 85, *longius* sp. nov.; 86, *reticulatus* sp. nov.; 87, *rutilipes* Papp; 88, *taiwanus* sp. nov.; 89, *tsuifengensis* sp. nov.; 90, *tungpuensis* sp. nov.